AYANNA M. HOWARD, PH.D.

http://telerobotics.jpl.nasa.gov/people/howard

EDUCATION

Ph.D. Electrical Engineering (Minor: Computer Science), University of Southern California, 1999
M.S. Electrical Engineering (Minor: Computer Science), University of Southern California, 1994
B.S. Computer Engineering, Brown University, 1993

PROFESSIONAL EXPERIENCE

Jet Propulsion Laboratory, Pasadena, California **1993-present**

Senior Robotics Researcher – Mobility Systems Concept Development Section 9/02-present
Deputy Manager – Strategic University Research Partnership Office 9/03-present

- *Deputy Manager:* responsible for managing science and technology research liaisons that establish and strengthen strategic relationships with leading universities.
- *Cognizant Engineer:* design software based on human cognition for landing a robotic spacecraft safely on a remote surface, for formation flying of multiple spacecrafts, and for safe navigation of a planetary rover.
- *Task Manager:* responsible for the state-of-the-art research development of an Artificial Intelligence software toolkit for interactive learning.

Robotics Researcher – Telerobotics Research and Applications 2/99-9/02

- *Task Manager:* secured funding for and managed integrated hardware/software development of a reconfigurable, modular, robotic system
- *Principal Investigator:* developed intelligent software tool for terrain-based analysis of the Martian surface for spacecraft landing
- *Cognizant Engineer*: designed and developed a real-time software package for autonomous rover navigation on hazardous terrain for a NASA-funded project.

Information Systems Engineer - Information Technologies Research Section 1/97-2/99

- Using clustering and neural network techniques, developed software algorithms for identifying ground-based targets retrieved from spectral frequency data.
- Using neural networks, developed vision based recognition algorithms for real-time identification and tracking of airborne targets.

Computer Scientist **-** Advanced Technology Section 6/93-12/96

- Using UNIX Based OSF/Motif and the C programming language, created a GUI Toolkit for intelligent manipulation of military tactical groupings.
- Provided real time data analysis of intelligent neural systems for launch vehicle health monitoring through a computer graphics support unit.

SELECTED PUBLICATIONS

- Published over 55 written works, 1996-present

- Released 10 software and hardware technology innovations for public licensing, 1999 - present

- 11 technology proposals funded, 1999 - present

- A. Howard, E. Tunstel, "Using Geospatial Information for Autonomous Systems Control," Frontiers of Geographic Information Processing, Springer Science, 2004.
- A. Howard, B. Werger, H. Seraji, "Integrating Terrain Maps into a Reactive Navigation Strategy" IEEE Int. Conf. on Robotics and Automation, Taiwan, September 2003.
- A. Howard, C. Padgett, "An Adaptive Learning Methodology for Intelligent Object Detection in Novel Imagery Data," NeuroComputing, March 2003.
- E. Tunstel, A. Howard, "Approximate Reasoning for Safety and Survivability of Planetary Rovers," Fuzzy Sets and Systems, Feb. 2003.
- H. Seraji and A. Howard, "Behavior-Based Navigation on Challenging Terrain: A Fuzzy Logic Approach," IEEE Transactions on Robotics and Automation, 18(3), pgs. 308-321, June 2002.

- A. Howard, “A Novel Information Fusion Methodology for Intelligent Terrain Analysis," IEEE International Conference on Fuzzy Systems (FUZZ-IEEE), Honolulu, HI, May 2002.
- A. Howard, H. Seraji, B. Werger, “Fuzzy Terrain-Based Path Planning for Planetary Rovers," World Congress on Computational Intelligence, Honolulu, HI, May 2002.
- A. Howard, H. Seraji, “An Intelligent Terrain-Based Navigation System for Planetary Rovers,” IEEE Robotics and Automation Magazine, December 2001.
- S.Mobasser, C.C.Liebe, A.Howard, “Fuzzy Image Processing in Sun Sensor,” 10th IEEE International Conference on Fuzzy Systems, Melbourne, Australia, December 2001.
- A. Howard, H. Seraji, “Vision-Based Terrain Characterization and Traversability Assessment,” Journal of Robotic Systems, 18(10), pgs. 577-587, 2001.
- A. Howard, E. Tunstel, D. Edwards, A. Carlson, “Enhancing Fuzzy Robot Navigation Systems by Mimicking Human Visual Perception of Natural Terrain Traversability,” Joint 9th IFSA World Congress and 20th NAFIPS International Conference, Vancouver, Canada, July 2001.
- A. Howard, G. Bekey, “Intelligent Learning for Deformable Object Manipulation,” Autonomous Robots, 9 (1): 5-6, August 2000.

PROFESSIONAL ACTIVITIES AND AWARDS

NASA SBIR Sub-topic Manager for Mars In-situ Robotics Technology (2003 – present)
AAAI Organizing Committee on Hands-on AI and Robotics Education Workshop (2003)
JPL Minority Education Initiatives Advisory Board Member (2002-present)
SEEMA, Aerospace Education Academy, Advisory Board Member (2003 – present)
Associate Editor for Int. Journal of Intelligent Automation and Soft Computing (00-present)
Louisiana Board of Regents R&D Grants Program Proposal Reviewer (2002, 2003)
Technical Reviewer – IROS’02, ICAR’03, IEEE Trans. Robotics/Automation, ICRA’04
MIT Technology Review Top 100 Young Innovator of the Year (2003)
Lew Allen Award of Excellence for significant technical contributions (2001)
NASA Space Act Award for Cognitive Sensor Technology (2003)
NASA Space Act Award for Path Planning Graphical User Interface (2003)
NASA Honor Award for Safe Robotic Navigation Task (2002)
Best Paper Award, 9th International Symposium on Robotics and Applications (2002)
JPL Technology and Applications Program (TAP) Honor Award (2000)
Member, Institute for Electrical and Electronic Engineers (IEEE) (92-present)
Member, American Association for Artificial Intelligence (AAAI) (99-present)
Senior Member of the Society of Women Engineers (SWE) (00-present)
NASA Tech Briefs Reader Advisory Panel (00-present)
Technical Recruiter, Jet Propulsion Laboratory (99-present)
Speakers Bureau, Jet Propulsion Laboratory (98-present)
JPL Director’s Advisory Council for Women (99-01)

COMMUNITY SERVICE ACTIVITIES

Chair and Founder, Pasadena Delta Academy (01-current)
- Mentoring program for young teen girls focused on math, science, and technology education.

Co-Founder, JUMP (JPL Undergraduate Mentoring Program for Women) (01-current)
- Provides mentoring support to undergraduate engineering students.

Executive Board Member, JobStarts, Inc. (99-03)
- Nonprofit that helps families successfully gain economic stability through work.□

Engineering Advisor, FIRST (01-02)
- Nonprofit founded to inspire students through participation in annual robotics competitions.

Space Expert, Challenger Center for Space Science Education - Space Day 2002
- Program designed to encourage students through interaction with visiting space experts.

Computer Tutor, Restore, Inc. (98-02)
- Provide computer training and hardware support for a battered women shelter.

TECHNICAL/COMPUTER SKILLS

Software: Java, C/C++, Visual Basic, TCL/TK, Matlab, OSF/Motif, Assembly, LISP, Unix/Linux, Windows, Web programming languages
Hardware: Sun Workstation, Macintosh, PC, IBM 7535 Robot Simulator, SkyBolt Vector Processor, Cascadable Neural Network Chip, Vision Camera, Pioneer Robot